MEMORANDUM

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To: Karen Lumino, USEPA Region 1 **Date:** 12/12/03

From: Michael Gefell, BBL **cc:** Martin Beskind, P.E., CT DEP
Liyang Chu, TetraTech NUS
William Morris, UIS
Bruce Thompson, *de maximis, inc.*
Bernard Kueper, Queens University
Gary Cameron, BBL

Re: NAPL Delineation Pilot Study
SRSNE Site -- Southington, Connecticut

Introduction

This document describes the results of a pilot study of field methods used to visually identify non-aqueous phase liquids (NAPLs) in soil at the Solvents Recovery Service of New England (SRSNE) Site (the Site) in Southington, Connecticut. The pilot study was performed as described in a letter from Blasland, Bouck & Lee, Inc. (BBL) to the United States Environmental Protection Agency (USEPA) dated October 24, 2003. BBL prepared this letter on behalf of the Potentially Responsible Parties (PRP Group or "the Group") for submittal to the USEPA and the Connecticut Department of Environmental Protection (CT DEP). This document presents the following information:

- Historical NAPL Observations in Overburden;
- Pilot Study Purpose and Objectives;
- Soil Sample Collection;
- Soil Sample Evaluation for NAPL Presence or Absence;
- Selection of Subsequent Soil Boring Locations; and
- Results.

The NAPL delineation pilot study was performed during the week of November 3-7, 2003. Attendees who participated in conducting the field program included: USEPA's geologist (Steve Mangion, November 3-7); USEPA's hydrogeologic consultant (Michael Healey, November 3-7); Dr. Bernard H. Kueper (November 3-4); the Group's project management consultants from *de maximis, inc.* (Bruce Thompson, intermittent attendance November 3-7 and John Hunt, November 3-7); two BBL geologists (Michael Gefell, November 3-5 and Michael Cobb, November 3-7); and drilling crews from O&M, Inc. and BBL (November 3-7). Additional visitors on November 3 and 4 included: Karen Lumino and Dick Willey (USEPA), Martin Beskind (CT DEP), and Gus Moody (Technical Committee Chairman).

The one-week field program consisted of drilling soil borings using two direct-push rigs, visually examining soil samples to identify NAPL, documenting soil types and observations regarding visual NAPL presence/absence, and selecting follow-up boring locations. The pertinent necessary information was obtained by direct visual observation of the soil samples including the

use of hydrophobic dye to enhance NAPL visibility, as appropriate. Drilling locations were selected based on collaborative discussions between the technical representatives listed above.

A total of 39 soil borings, PTB-1 through PTB-39, were performed at the locations shown on Figure 1. Soil samples were collected continuously from ground surface to the depth of equipment refusal, which was generally consistent with expected top of bedrock depths. Soil sampling activities were performed in accordance with the existing Health and Safety Plan (BBL, August 1996). In addition, the collection and evaluation of soil samples and management of pilot-study derived waste was performed pursuant to the existing Field Sampling Plan (BBL, August 1996), as amended by the information presented in BBL's letter to USEPA dated October 24, 2003. The soil samples were collected using direct-push sampling equipment following the Standard Operating Procedure presented in Attachment 2 to the October 24, 2003 letter, rather than split spoons as described in the existing FSP. This modification reduced the quantity of soil cuttings requiring management and improved soil sample quality and drilling production.

The remainder of this letter presents background information and the purpose and results of the NAPL delineation pilot study.

Historical NAPL Observations in Overburden

Previous investigations at the site encountered visible NAPL at 13 locations in the overburden (Figures 1 and 2). These include:

- LNAPL layers and/or sheens in three overburden groundwater monitoring wells in the former SRSNE Operations Area;
- NAPL, sheens, or positive hydrophobic dye tests observed during overdrilling and grouting of eight former on-site interceptor system wells in the former SRSNE Operations Area;
- Recoverable DNAPL at one downgradient groundwater extraction well (RW-5) – approximately 3 gallons were recovered, but no DNAPL has been observed there since 1995; and
- Observation in a split-spoon during drilling next to well RW-5 and subsequent recovery of DNAPL in the co-located DNAPL monitoring well (DMW-601) – approximately 1 gallon was recovered, but no DNAPL has been observed there since 1995.

Overburden LNAPL and DNAPL samples have had similar chemical composition and dark brown color. Figure 3a shows a representative example of the NAPL color, which is DNAPL from well DMW-601. Due to their dark color, the NAPLs are visible in the light to medium, reddish-brown to tan soil (Figure 3b). In addition, NAPL sheens are sometimes observed in soil samples and in soil-water shake tests. The DNAPL from well DMW-601 produced an obvious sheen during a soil-water shake test and a positive reaction with hydrophobic dye (Sudan IV; see Figure 3c); however, it did not produce a noteworthy response under ultraviolet light. The overburden NAPL density and viscosity have been measured, and are similar to those of water.

Pilot Study Purpose and Objectives

The purpose of the NAPL delineation pilot study was to drill soil borings in and around the zone where NAPL had already been visually observed in soil or monitoring wells and assess the new soil samples for the presence of visible NAPL using a specified procedure described in detail in BBL's October 24, 2003 letter to the USEPA. Specific objectives were to: 1) identify the horizontal and vertical locations of NAPL; 2) characterize soil strata containing visible NAPL in terms of grain-size, texture, etc.; and 3) interpret the degree of NAPL saturation in soil (pooled versus residual).

The pilot study field approach entailed drilling as many soil borings as practicable using two direct-push drilling rigs within the stated one-week period. In addition to providing information regarding the effectiveness and implementability of the field methods described herein, the NAPL delineation pilot study provided further data to assist in delineating the source zone to be evaluated for potential remedial technologies in the Feasibility Study.

The field methods that were used for visually identifying NAPL in soil samples were tested by *de maximis* and BBL during a pre-pilot assessment on October 20, 2003, as detailed in the October 24, 2003 letter.

Soil Sample Collection

A total of 39 pilot test borings ("PTB" series) were drilled between November 3 and 7, 2003, at locations in the Operations Area and the former Cianci Property, as shown on Figure 1. Dual-tube, direct-push drilling was conducted using two rigs, which were operated by BBL and O&M, Inc. Soil samples were obtained continuously from ground surface to the depth of equipment refusal, which generally corresponded well to the expected top of bedrock depth, as estimated based on prior boring data (see October 24, 2003 letter). Thirty of the 39 borings encountered bedrock within 2 feet of the expected depth. Three borings were advanced 2.5 to 4 feet deeper than expected, and 6 borings met refusal between 3 and 7 feet above the expected top of bedrock surface. The 6 borings that did not reach the expected top of bedrock were generally clustered near the south end of the sheetpile wall or the north end of the sheetpile wall, and include: PTB-3, PTB-4, PTB-9, PTB-10, PTB-28, and PTB-29. These borings likely encountered cobbles or boulders in the deep overburden. Each soil boring location was grouted upon completion, staked and labeled in the field.

Each soil sample was retrieved in a Lexan sleeve, capped at both ends, and taken to a central sample processing area next to the NTCRA 1 treatment system building. The Lexan sleeve was cut open axially, and the sample underwent evaluation for the presence or absence of visible NAPL. In addition, following the evaluation of the sample for visible NAPL, a BBL geologist classified the soil sample in terms of: 1) soil type; 2) color; 3) percent recovery; 4) relative moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) staining, if any; 9) odors, if any; and 10) any other noteworthy observations. BBL soil boring logs are included in Attachment 1 to this memorandum. USEPA's hydrogeologic consultant also independently logged soil descriptions. Non-disposable subsurface sampling devices used to collect analytical soil samples were decontaminated between boring locations using an Alconox scrub and/or potable water rinse.

Soil Sample Evaluation for NAPL Presence or Absence

After opening the Lexan™ sleeve, the soil sample in the sleeve was quickly screened for volatile organic vapors using a photoionization detector (PID). During screening, the soil was split open using a stainless steel trowel and the PID probe was placed in the opening. Such readings were obtained along the entire length of the sample. Specific soil intervals that indicated a PID reading >100 parts per million total detectible organic vapors underwent further detailed evaluation for visible NAPL. The assessment for NAPL included a combination of the following tests/observations.

- Evaluation for visible NAPL sheen or dark brown NAPL in soil – NAPL sheens generally were not observed in soil samples. NAPL was observed within the unopened Lexan™ sleeve in some circumstances. For example, NAPL was observed as a separate phase liquid above the soil within the Lexan™ sleeve for the 12-15 ft depth interval at boring PTB-39 (Attachment 2). In addition, NAPL droplets were observed inside the unopened Lexan™ sleeve in soil in a few soil samples (e.g., the 12-16 ft interval at PTB-2 and 8-12 ft depth interval at boring PTB-36). After opening, NAPL staining or NAPL droplets were observed within the soil sample after splitting the sample axially (e.g., the 8-12 ft interval at boring PTB-23 and the 10-12 ft interval at boring PTB-26).

- Soil/dye smear test – A portion of the selected soil interval was placed in disposable polyethylene dish, along with Oil Red O powder. The soil and dye was manually mixed and smeared in the dish to create a paste-like consistency using a new nitrile glove-covered hand for approximately 30 to 60 seconds. The dish was emptied and gently rinsed using distilled water. A positive test result was indicated by bright red (not faint pink) color on the dish and/or glove. Several examples of positive test results are included in Attachment 2. USEPA's hydrogeologic consultant performed a "blank" by mixing Oil Red O powder and distilled water in a polyethylene dish, and found that this procedure produced a pink stain on the dish and glove. Therefore, to assist in distinguishing NAPL, when present, the dish and glove used to perform soil-dye smear tests were compared to those that were previously used on October 20, 2003 with soil samples of known NAPL saturation.

- Soil-water shake test – A small quantity of soil (up to 15 cc) was placed in a clear, colorless, 40 mL vial containing an equal volume of potable or distilled water. The jar was closed and gently shaken for approximately 10 to 20 seconds. The surface of the water was then evaluated for a visible sheen or else a temporary layer of foam. A positive test result was indicated by the presence of a visible sheen or foam on the surface of water. In addition, beginning on November 5, 2003, these samples were also decanted into disposable polyethylene dishes and gently "panned" in the presence of natural light. This process was found to significantly improve the ability to identify NAPL sheens in soil.

- Oil Red O Shake Test – Following the soil-water shake test noted above, a small quantity (approximately 0.5 to 1 cc) of Oil Red O powder was placed in a jar with soil and distilled water. The jar was closed and gently shaken for approximately 10 to 20 seconds. The contents in the closed jar was examined for visible bright red-dyed liquid inside the jar. Positive test results were indicated by a reaction between the dye and a bright red coating the inside of the vial (particularly above the water line) or red-dyed liquid within the soil. The shake test vials were also compared to vials that were used to

perform Oil Red O shake tests on October 20, 2003 with soil samples of known NAPL saturation. Several examples of positive Oil Red O shake test vials are shown in Attachment 2.

- FLUTe™ NAPL Ribbon – For comparison with the methods listed above, USEPA's geologist and hydrogeologic consultant also placed axially split soil cores on strips of FLUTe™ NAPL ribbon. The soil cores were allowed to "react" with the FLUTe™ NAPL ribbon material for several hours, and the ribbon was examined for signs of NAPL staining. This method proved effective at identifying NAPL when present at relatively high saturation (e.g., a NAPL pool encountered at boring PTB-2). However, the other methods were determined to be easier and quicker to implement and produced results that were obvious and definitive. Therefore, after the first few soil borings were completed, FLUTe™ NAPL ribbon was not put to significant use.

- Estimation of Relative Degree of NAPL Saturation – When NAPL was interpreted as present in a particular portion of soil, the field team estimated the relative degree of NAPL saturation in the soil. Specifically, an interpretation was made as to whether the observed NAPL is pooled (continuous section of soil in which the pore spaces are filled with a mixture of NAPL and water) or residual (isolated droplets or blebs of NAPL, surrounded by pore spaces containing only water).

The results of each test or observation were recorded on a NAPL evaluation log sheet (Table 1). Any evidence of visible NAPL in a sample was documented on the log sheet. In addition, where possible, the BBL geologist noted the thickness of the interval(s) containing visible NAPL. The primary judgment that was made with each soil sample, however, was whether visible NAPL was present or absent. This degree of soil sample evaluation allowed a relatively high degree of drilling productivity, which would not have been achieved if every soil sample containing NAPL was tested at numerous intervals to pinpoint the vertical limits of NAPL in the Lexan™ sleeve.

Subsequent soil boring locations were selected based on collaborative discussion between USEPA's geologist, USEPA's hydrogeologic consultant, Dr. Bernard H. Kueper, and a BBL geologist.

Results

Attachment 1 presents subsurface logs for the soil borings completed during the NAPL delineation pilot study, and Attachment 2 includes representative photographs of visual evidence of NAPL in soil. Table 1 summarizes visible NAPL testing results. With rare exception, interpretations regarding the presence and relative saturation of NAPL (residual or pooled) were unanimous among the technical representatives of the USEPA and the Group. Rare samples that did not yield unanimous interpretations were not included on Figures 1 and 2.

As summarized on Figure 1, visible NAPL was not interpreted as present at any of the 19 pilot test borings performed at the former Cianci Property. Pooled and or residual NAPL were identified, however, at 11 of the 20 soil borings within the former Operations Area of the site.

Figure 1 shows the 8 pilot test boring locations where pooled NAPL was interpreted as present, including: PTB-2, PTB-23, PTB-26, PTB-30, PTB-31, PTB-36, PTB-38, and PTB-39. The soil intervals containing interpreted NAPL pools were typically composed of relatively well-sorted, brown or gray-brown, fine sand or fine-to-medium sand with little to no silt or gravel. These 8

borings also contained residual NAPL at other depths. Figure 1 also shows the following pilot test boring locations that were interpreted to contain residual NAPL, but no pooled NAPL, including: PTB-20, PTB-35, and PTB-37. In plan view, the pilot test borings that contained pooled NAPL are clustered in the western and eastern portions of the Operations Area, separated by a central area where the soil borings contained only residual NAPL, or else no visible NAPL. With the exception of boring PTB-30, in the northwestern portion of the former Operations Area, borings containing visible NAPL are generally surrounded by locations that lacked visible NAPL.

Figure 2 shows schematic cross sections summarizing the depth of soil samples where pooled or residual NAPL were encountered in the former Operations Area. The borings shown on each cross section have similar ground surface elevations. Thus, for simplicity, the boring data are shown in terms of depth below ground surface. Coordinates for each boring are included on the subsurface log forms in Attachment 1. The cross sections support the following general statements:

- While the potential existence of NAPL remaining in the subsurface at the former Cianci Property cannot be ruled out, it appears that NAPL is much more prevalent in the former Operations Area of the site;

- Pooled NAPL was interpreted as present below the approximate water table at several locations in the former Operations Area;

- Residual NAPL was interpreted as present above and below the water table at several locations in the former Operations Area; and

- Pooled and residual NAPL were both encountered near the base of the overburden at several locations in the Operations Area.

These results will be used to estimate the potential range of NAPL volume within the overburden and assess remedial technologies as part of the Feasibility Study.

MJG/plf
Attachments

Table

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TABLE 1

NAPL DELINEATION PILOT TEST
SRSNE SUPERFUND SITE -- SOUTHINGTON, CONNECTICUT

NAPL EVALUATION LOG SHEET

Location ID	Date	Refusal Depth (ft. bgs)	Depth Interval (feet below ground surface)		Observation/Test Results[1]						Participants Involved in Interpreting NAPL Presence[2]										Miscellaneous Comments/Observations
											Mangion		Healey		Kueper		BBL Geologist		de maximis		
			Top	Bottom	PID (ppm, maximum)	Visible NAPL Sheen	Visible NAPL	Soil-Dye Smear Test	Soil-Water Shake Test	Oil Red-O Shake Test	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	
PTB-1	11/3/03	16.5	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-2	11/3/03	16.5	8	12	>1,000	-	-	+	+8.6 '-10.5-12	+	High	-	+	-	+	-	+	-	0	0	8.6 ft. and 10.5-12 ft. NAPL; entire sample PID >1000 ppm.
PTB-2	11/3/03	16.5	0	4	460 @ 2.0'	-	-	-	foam	-	+	-	+	-	+	-	+	-	0	0	
PTB-2	11/3/03	16.5	4	8	474 @ 5.9-6.1'	-	-	+	+	+	+	-	+	-	+	-	+	-	0	0	
PTB-2	11/3/03	16.5	12	16	3,300	-	+	+	+	+		+		+		+		+	0	0	NAPL droplets visible in sleeve.
PTB-2	11/3/03	16.5	16	18	5,600	-	+	+	-	+	+	-	+	-	+	-	+	-	0	0	
PTB-2	11/3/03	16.5	18	20	619	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
PTB-2	11/3/03	16.5	20	21	256	-	-	+ slight	+ slight foam	-	+	-	+	-	-	-	+	-	0	0	
PTB-3	11/6/03	20	NT	NT	<1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-4	11/3/03	23	20	23	34	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
PTB-5	11/3/03	22	5	10	340	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
PTB-5	11/3/03	22	10	15	350 @ 13.9-14'	-	-	-	foam	-	-	-	-	-	-	-	-	-	0	0	
PTB-6	11/4/03	30	NT	NT	14.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-7	11/3/03	31	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-8	11/3/03	27	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-9	11/3/03	18	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-10	11/6/03	20	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-11	11/5/03	21.5	NT	NT	1.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-12	11/4/03	30	16	20	68 @ 17'	-	-	-	foam	-	-	-	-	-	possible	-	+	-	0	0	
PTB-12	11/4/03	30	24	24.5	85 @ 24'	-	-	-	slight foam	-	-	-	-	-	-	-	-	-	0	0	
PTB-13	11/4/03	23	NT	NT	9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-14	11/7/03	35	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-15	11/4/03	25	9	10	114	-	-	-	foam	-	-	-	-	-	-	-	-	-	0	0	
PTB-15	11/4/03	25	10	10.2	280	-	-	NA	foam	-	-	-	-	-	-	-	-	-	0	0	
PTB-16	11/5/03	23	NT	NT	15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	

See Notes on Page 4.

TABLE 1

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Location ID	Date	Refusal Depth (ft. bgs)	Depth Interval (feet below ground surface)		Observation/Test Results[1]						Participants Involved in Interpreting NAPL Presence[2]										Miscellaneous Comments/Observations
											Mangion		Healey		Kueper		BBL Geologist		de maximis		
			Top	Bottom	PID (ppm, maximum)	Visible NAPL Sheen	Visible NAPL	Soil-Dye Smear Test	Soil-Water Shake Test	Oil Red-O Shake Test	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	
PTB-17	11/5/03	22.5	6	8	140	-	-	-	trace foam	-	-	-	-	-	0	0	-	-	-	-	Petrol. type odor; trace sheen noted in liner above next sample.
PTB-18	11/5/03	20	19	20	250	-	-	-	trace foam	-	-	-	-	-	0	0	-	-	-	-	
PTB-19	11/4/03	15	NT	NT	9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-20	11/5/03	14	0	4	800 @ 1..0'	-	-	-	foam	-	-	-	-	-	0	0	-	-	-	-	
PTB-20	11/5/03	14	4	8	840 @ 7.5-8.0'	-	-	-	slight sheen	-	+ trace	-	+ trace	-	0	0	+	-	+	-	
PTB-20	11/5/03	14	8.5		1600	-	-	-	sheen and foam	+	+	-	+	-	0	0	+	-	+	-	Piece of "rubber" at 8.5 ft. with 1600 PID. Obvious sheen in shake test and Red O shake test.
PTB-20	11/5/03	14	11		1700	-	+	-	sheen and foam	+	+	-	+	-	0	0	+	-	+	-	Red O shake test similar to 3% standard. Possible NAPL visible through Lexan at 11 ft.
PTB-20	11/5/03	14	12 ~13	14	4,200	-	-	-	foam and sheen	-	+ trace	-	+ trace	-	0	0	+	-	+	-	
PTB-21	11/5/03	16	NT	NT	10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-22	11/5/03	14	NT	NT	10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-23	11/5/03	12	1	4	1,050	+	-	+	foam sheen	+	+	-	+	-	0	0	+	-	+	-	Similar to 1-3% standards.
PTB-23	11/5/03	12	4	5	900	+	-	+ weak	foam and sheen	+ weak	+	-	+	-	0	0	+	-	+	-	
PTB-23	11/5/03	12	6	7	2,200	+	-	+ strong	foam and sheen	+ strong	+	-	+	-	0	0	+	-	+	-	Similar to 10% standard. Yellow discoloration of liner.
PTB-23	11/5/03	12	8	12	1,200	+	+	+ strong	foam and sheen	+ mod		+		+	0	0		+		+	Apparent NAPL runs out of sample.
PTB-24	11/5/03	16	8	12	150	-	-	-	foam	-	-	-	-	-	0	0	-	-	-	-	
PTB-24	11/5/03	16	12	16	240	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	
PTB-25	11/5/03	14	NT	NT	10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-26	11/6/03	16	4	6	9,900	+	-	+	+	+	+	-	+	-	0	0	+	-	+		Similar to 10% standard.
PTB-26	11/6/03	16	6	8	300	+	-	+	+	+	+	-	+	-	0	0	+	-	+	-	Near residual-pooled threshold. Similar to 30% standard.
PTB-26	11/6/03	16	8	11	500	+	+	+	+	+		+		+	0	0		+		+	Separate phase visible in dish. Similar to 30% standard.
PTB-26	11/6/03	16	12	16	300	+ strong	+	+ low	+	NA	+	-	+	-	0	0	+	-	+	-	Some probable smearing from above. Similar to 5% standard.
PTB-27	11/6/03	25	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-28	11/6/03	20	NT	NT	3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-29	11/6/03	18	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-30	11/6/03	12	6	8	570	?*	-	+	foam sheen?*	+	+	-	+	-	0	0	+	-	+	-	Similar to 5% standard.

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PTB-30	11/6/03	12	9	11	800	?*	+	+	foam sheen?*	+		+		+	0	0		+		0	Similar to 20-30% standard.
PTB-30	11/6/03	12	11	12	300	?*	-	+ weak	foam sheen?*	+	+	-	+	-	0	0	+	-	+	-	Similar to 1-3% standards.
PTB-31	11/6/03	14	2	4	300	+ strong	-	+	foam and sheen	+	+	-	+	-	0	0	+	-	+	-	Similar to 1% standard.
PTB-31	11/6/03	14	4	8	8,300	+ moderate	-	+	foam and sheen	+	+	-	+	-	0	0	+	-	+	-	Similar to 10-20% standard.
PTB-31	11/6/03	14	8	12	3,000	+	-	+	foam and sheen	+	+	-	+	-	0	0	+	-	+	-	Similar to 10-20% standard.
PTB-31	11/6/03	14	12	14	3,500	+	+	+	foam and sheen	+		+		+	0	0		+		+	
PTB-32	11/6/03	8	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-33	11/7/03	21.5	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-34	11/7/03	14	NT	NT	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
PTB-35	11/7/03	15	6	8	150	-	-	-	foam	-	-	-	-	-	0	0	-	-	0	0	
PTB-35	11/7/03	15	8	12	800	-	-	+ weak	foam	+ weak	+	-	+	-	0	0	+	-	+	-	Very slight positive residue.
PTB-35	11/7/03	15	12	15	130	-	-	+ weak	-	-	-	-	-	-	0	0	-	-	0	0	
PTB-36	11/7/03	14	1	4	300	-	-	-	foam	-	-	-	-	-	0	0	-	-	-	-	Wood in sample.
PTB-36	11/7/03	14	4	8	600	-	-	-	foam	-	-	-	-	-	0	0	-	-	-	-	
PTB-36	11/7/03	14	8	10	1,700	+ weak	+	+	foam and sheen	+		+		+	0	0		+		+	Fine sand similar to 30%
PTB-36	11/7/03	14	10	12	1,700	+	+	+	foam and sheen	+		+		+	0	0		+		+	Fine to coarse sand similar to 30%
PTB-36	11/7/03	14	12	14	327	+	+	+	foam and sheen	+	0	0	+		0	0	+		0	0	Near residual-pooled threshold.
PTB-37	11/7/03	14	12	14	67	-	-	-	foam	-	0	0	-	-	0	0	-	-	0	0	Sample shaken from river.
PTB-37	11/7/03	14	1	4	600	-	-	-	foam	-	0	0	-	-	0	0	-	-	0	0	
PTB-37	11/7/03	14	8	12	1,000	-	-	+ weak	foam	+ weak	+	-	+	-	0	0	+	-	+	-	Very slight positive residue (≤ 1%).
PTB-38	11/7/03	14	1	4	1,100	-	-	-	-	-	0	0	+	-	0	0	+	-	0	0	Trace residual NAPL.
PTB-38	11/7/03	14	4	8	350	-	-	-	-	-	0	0	-	-	0	0	-	-	0	0	
PTB-38	11/7/03	14	8	12	4,000	+	+	+	foam and sheen	+	0	0		+	0	0		+		+	
PTB-38	11/7/03	14	12	14	3,500	-	-	-	foam	-	0	0	-	-	0	0	-	-	0	0	
PTB-39	11/7/03	15	0	4	300	-	-	-	foam	-	0	0	-	-	0	0	-	-	0	0	

See Notes on Page 4.

TABLE 1

NAPL DELINEATION PILOT TEST
SRSNE SUPERFUND SITE -- SOUTHINGTON, CONNECTICUT

NAPL EVALUATION LOG SHEET

Location ID	Date	Refusal Depth (ft. bgs)	Depth Interval (feet below ground surface)		Observation/Test Results[1]						Participants Involved in Interpreting NAPL Presence[2]										Miscellaneous Comments/Observations
											Mangion		Healey		Kueper		BBL Geologist		de maximis		
			Top	Bottom	PID (ppm, maximum)	Visible NAPL Sheen	Visible NAPL	Soil-Dye Smear Test	Soil-Water Shake Test	Oil Red-O Shake Test	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	Residual	Pooled	
PTB-39	11/7/03	15	4	8	450	+	-	+	foam and sheen	+	0	0	+	-	0	0	+	-	0	0	Strong residual 10-15% range.
PTB-39	11/7/03	15	8	12	2,000	+	+	+	foam and sheen	+	0	0		+	0	0		+	0	0	Very strong hit ≥ 30% standard.
PTB-39	11/7/03	15	12	15	3,500	+	+	+	foam and sheen	+	0	0		+	0	0		+		+	1/8" NAPL pooled with water above core.

Notes:

NT= Not sample tested for NAPL; field inspection did not reveal any visible NAPL; no interval exceeded 100 ppm screening threshold.
* = Sheen difficult to detect without natural light.
** = Refusal depth interpreted as top of bedrock except at PTB-9, which likely encountered a boulder in the deep overburden.
bgs = Below ground surface.

1. + = Visual test produced positive result.
- = Visual test produced negative result.
0 = Visual test not performed.

2. + = Participant present and interprets that NAPL is PRESENT at the stated degree of saturation.
- = Participant present and interprets that NAPL is NOT PRESENT at the stated degree of saturation.
0 = Not participating in NAPL evaluation.

Figures

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SRSNE OPERATIONS AREA

FORMER TANK FARM

FORMER FUEL BLENDING TANKS

FUEL STORAGE TANK

BUILDINGS AND TANKS REMOVED JULY-AUGUST 1999

FORMER BURIED DISCHARGE PIPE

FORMER COOLING TOWER

FORMER OPERATIONS BUILDING

FORMER SHED

FORMER PRIMARY LAGOON

8"PVC INV=159.57

FORMER DRUM STORAGE AREA

FORMER SECONDARY LAGOON

FORMER DRUM STORAGE AREA

FORMER BEACH FIELD

PARKING

MICKE GARA

FORMER OPEN-PIT INCINERATOR

OUTFALL

24"RCP INV=156.42

STEEL SHEETPILE WALL

GATE

4' WIDE GATE

NTCRA 1 TREATMENT SYSTEM BUILDING

TREATMENT SYSTEM DISCHARGE PIPE

EXISTING UNDERGROUND PIPELINE

P-8
P-8A
P-4A
P-4B
P-2B
P-2A
P-1A
P-1B
P-16
P-5A
P-5B
P-9

PTB-1
PTB-2
PTB-3
PTB-4
PTB-5
PTB-6
PTB-7
PTB-8
PTB-9
PTB-9A
PTB-10
PTB-11
PTB-12
PTB-13
PTB-14
PTB-15
PTB-16
PTB-17
PTB-18
PTB-19
PTB-20
PTB-21
PTB-22
PTB-23
PTB-24
PTB-25
PTB-26
PTB-27
PTB-28
PTB-29
PTB-30
PTB-31
PTB-32
PTB-33
PTB-34
PTB-35
PTB-36
PTB-37
PTB-38
PTB-39
PTB-2B

A
A'
B
B'
C
C'
D
D'

RW-1
RW-2
RW-3
RW-4
RW-5
RW-6
RW-7
RW-8
RW-9
RW-10
RW-11
RW-12

PZR-1
PZR-2
PZR-3
PZR-4
PZO-1
PZO-2
PZO-3
PZO-4

CPZ-1
CPZ-1R
CPZ-2
CPZ-2A
CPZ-3
CPZ-3R
CPZ-4A
CPZ-4R
CPZ-5
CPZ-5R
CPZ-6
CPZ-6A
CPZ-6R
CPZ-7
CPZ-7R
CPZ-8
CPZ-8R
CPZ-9
CPZ-9R
CPZ-10
CPZ-10R

DN-1
DN-2

MW-123A
MW-123C
MW-125A
MW-125C
MW-301
MW-302
MW-303
MW-304
MW-305
MW-306
MW-307
MW-308
MW-310
MW-311
MW-408
MW-409
MW-410
MW-411
MW-412
MW-413
MW-414
MW-415
MW-416
MW-502
MW-601
MW-L303
MRW-5
MWD-601
MWL-301
MWL-302
MWL-303
MWL-304
MWL-305
MWL-306
MWL-307
MWL-308
MWL-310
MWL-311

PW-406
PW-407

TW-7A
TW-9

WE-3
WE-5

PROPERTY LINE

EXISTING CONCRETE PAD

WETLAND

NTCRA 1 CONTAINMENT AREA

EXISTING STRUCTURE

FENCE

P-10 MONITORING WELL

PZR-3 NTCRA 1 PIEZOMETER

CPZ-10 NTCRA 1 COMPLIANCE PIEZOMETER

RW-1 NTRCA 1 OVERBURDEN EXTRACTION WELL

12 FORMER ON-SITE INTERCEPTOR INTERCEPTOR SYSTEM EXTRACTION WELL

LOCATIONS WITH PREVIOUS VISUAL NAPL IDENTIFICATION

DEPRESSIONS IN TOP OF BASAL TILL

PILOT-TEST BORING WITH NO NAPL DETECTED

PILOT TEST BORING WITH INTERPRETED POOLED NAPL

PILOT TEST BORING WITH INTERPRETED RESIDUAL NAPL

A——A' CROSS SECTION LOCATION

NOTES:

1. SITE PLAN TAKEN FROM DIVERSIFIED TECHNOLOGIES CORP., 556 WASHINGTON AVE., NORTH HAVEN, CT, DATED 6/93. TOPOGRAPHY REPORTED TO HAVE BEEN DIGITIZED FROM TOWN OF SOUTHINGTON TOPOGRAPH MAPS G-7, G-8, G-9; PHOTOGRAPHY DATED NOV. 1978, SCALE: 1"=100'. PROPERTY LINES REPORTED TO HAVE BEEN DIGITIZED AND LOT NUMBERS TAKEN FROM "PROPERTY MAP, TOWN OF SOUTHINGTON" MAPS 134 & 147, SCALE: 1"=100' BY DIVERSIFIED TECHNOLOGIES CORPORATION.
2. BENCHMARK #1 IS AT ELEVATION 164.03. PK NAIL; S'LY.
3. THE LOCATIONS OF EXISTING DRIVE POINTS, WELLS AND PIEZOMETERS ARE APPROXIMATE ONLY.
4. LOCATIONS OF PTB BORINGS AND CONCRETE PADS SURVEYED BY CONKLIN & SOROKA, NOVEMBER 2003.

0 30' 60'
GRAPHIC SCALE

SRSNE PRP GROUP
SOUTHINGTON, CONNECTICUT

FS NAPL-DELINEATION PILOT TEST

INITIAL PILOT-TEST BORING LOCATIONS AND RELEVANT SITE FEATURES

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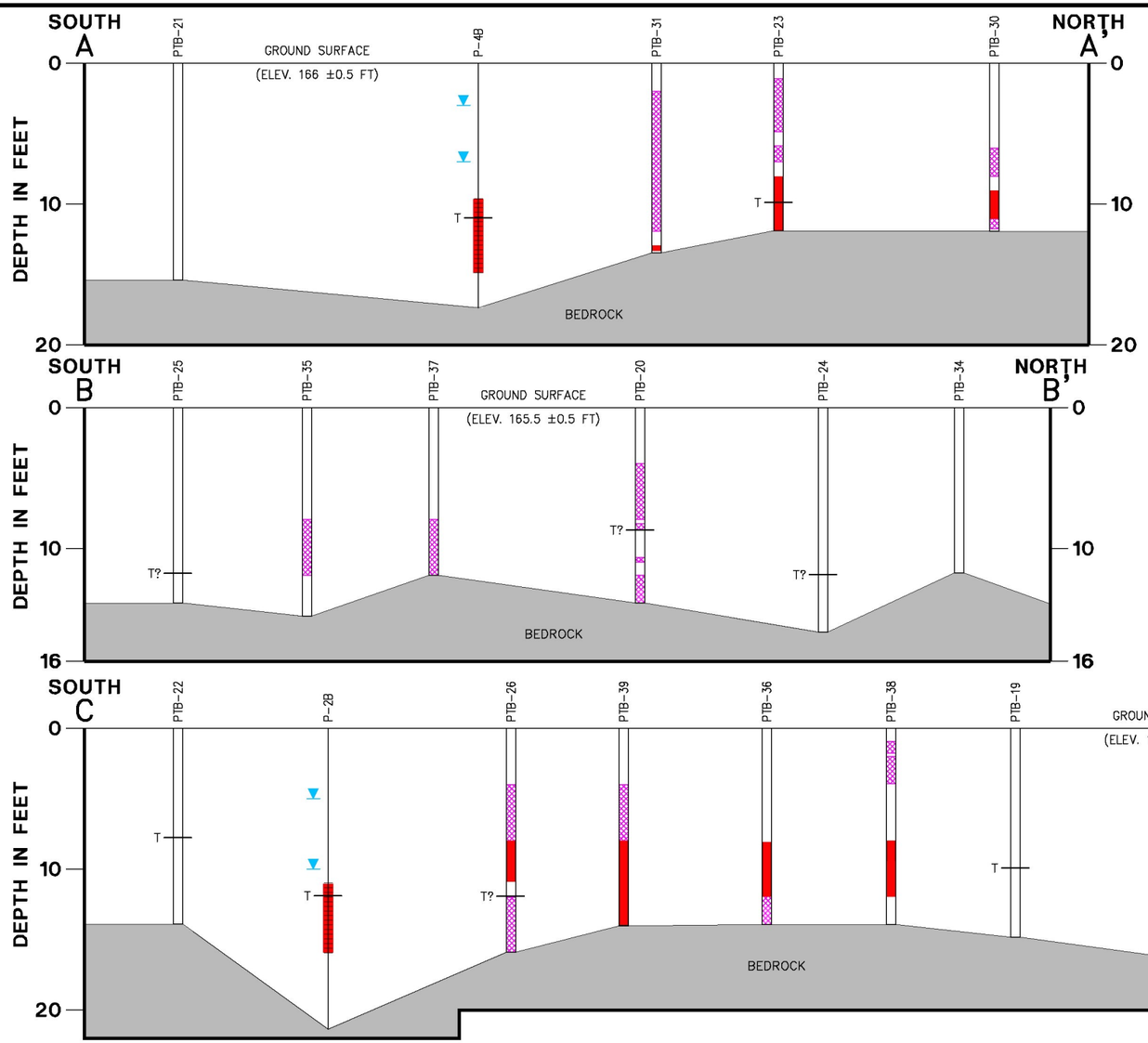
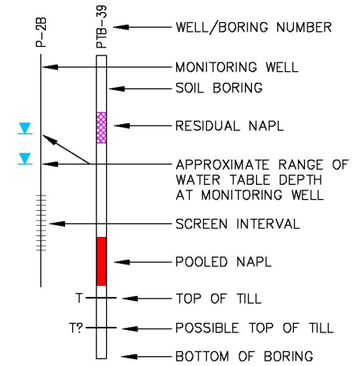
FIGURE 1

X: 08331X09.DWG
L: ON=*, OFF=REF*
P: PAGESET/PLT-D2BL
12/11/03 SYR-85-KMD DMW RCB
08331003/08331B03.DWG



LEGEND



X: 08331X09.DWG
L: ON=*, OFF=REF*
P: PAGESET/PLT-D2BL
12/11/03 SYR-85-KMD DMW RCB
08331003/08331B04.DWG

SRSNE PRP GROUP
SOUTHINGTON, CONNECTICUT

FS NAPL-DELINEATION PILOT TEST

SCHEMATIC CROSS SECTIONS WITH DEPTHS OF VISIBLE NAPL

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FIGURE 2

Attachment 2

BBL®
BLASLAND, BOUCK & LEE, INC.
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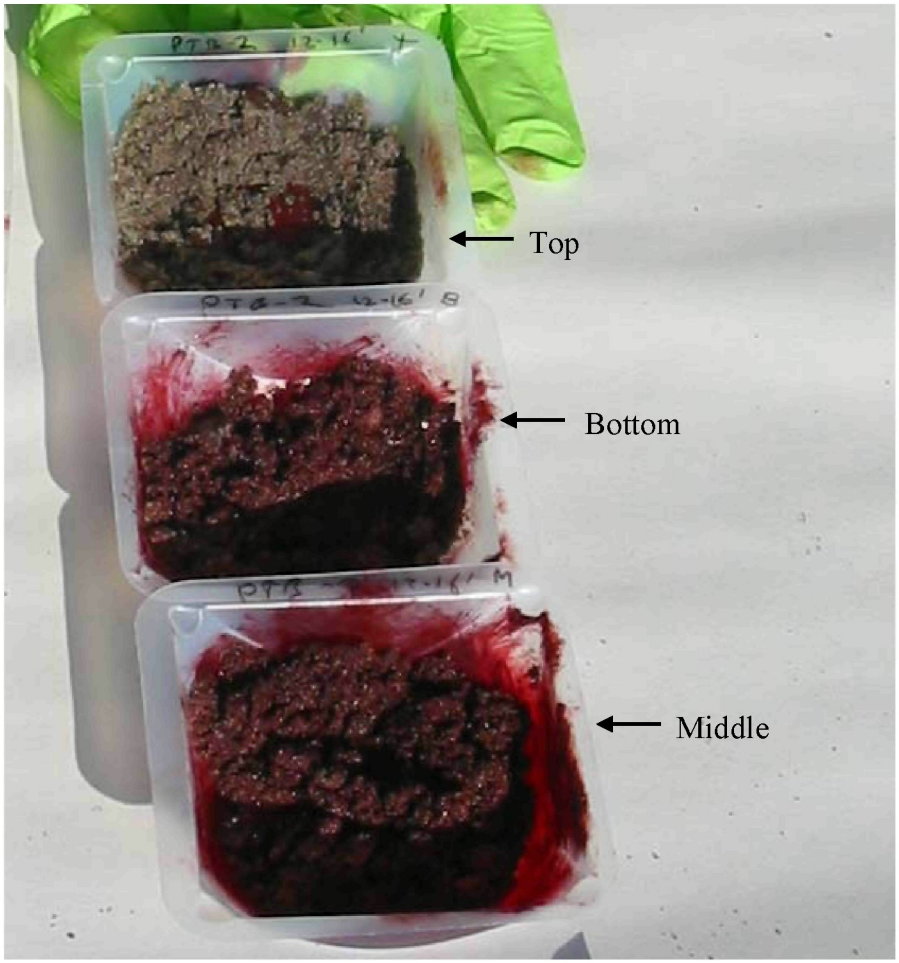
PTB-2 (12-16 feet bgs)

SRSNE Superfund Site
Southington, Connecticut
NAPL Delineation Pilot Study



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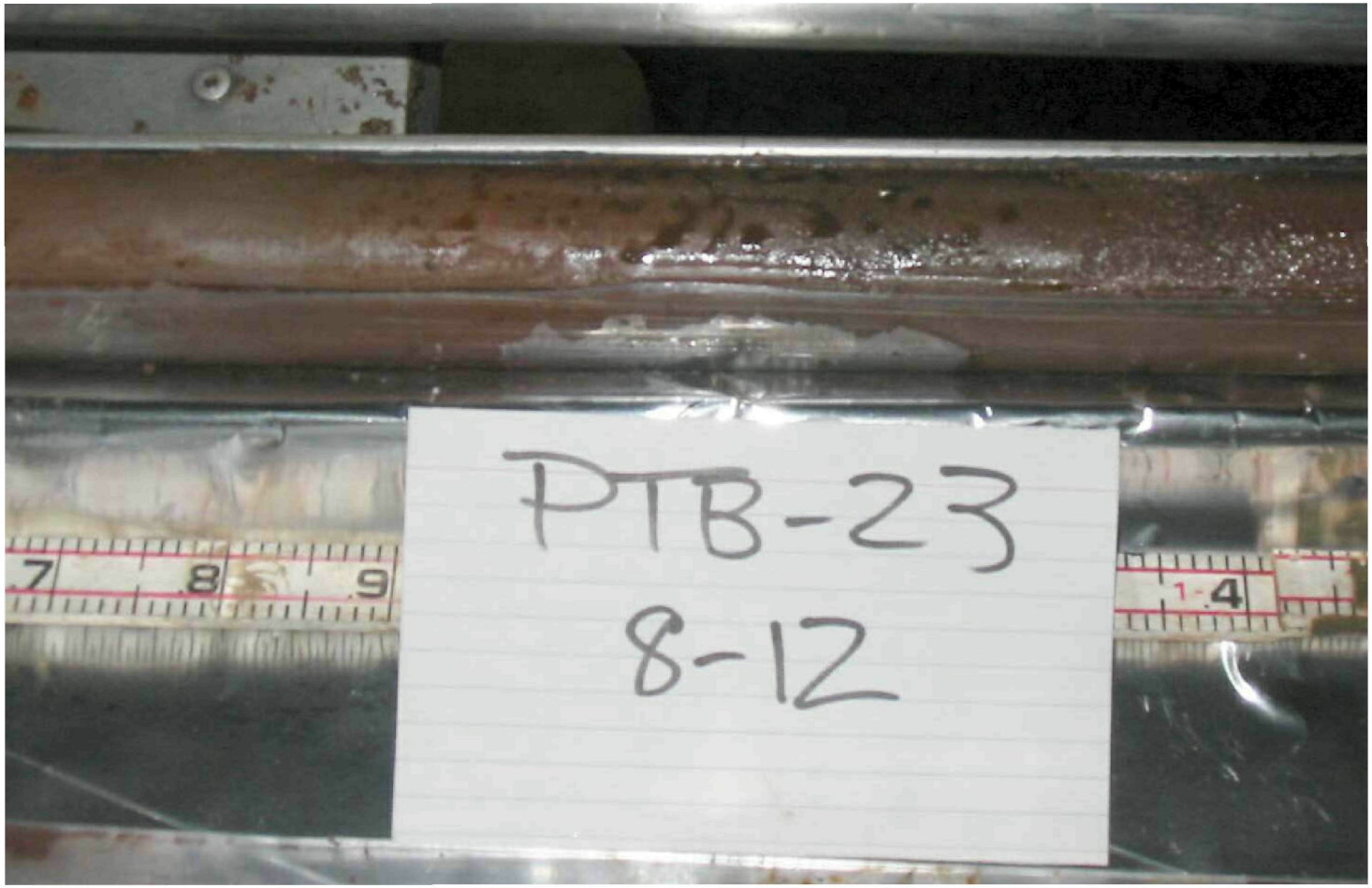
PTB-23 (8-12 feet bgs)

SRSNE Superfund Site
Southington, Connecticut
NAPL Delineation Pilot Study



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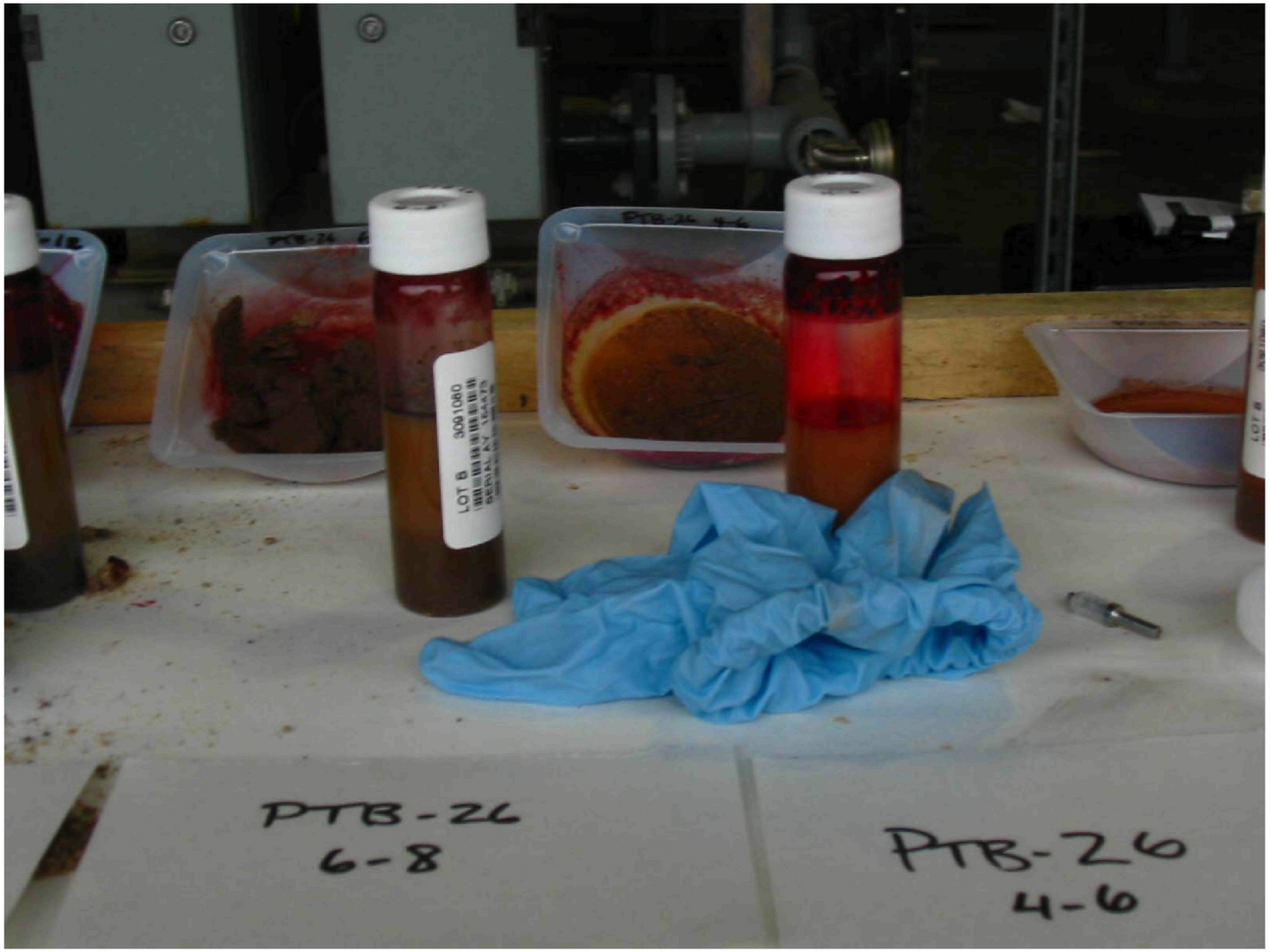
PTB-26 (4-8 feet bgs)

SRSNE Superfund Site
Southington, Connecticut
NAPL Delineation Pilot Study



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PTB-26 (8-16 feet bgs)

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PTB-30 (9-11 feet bgs)

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NAPL Delineation Pilot Study

Red O dye added but not mixed.

Sample and dye mixed.

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PTB-35 (0-15 feet bgs)

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PTB-36 (4-14 feet bgs)

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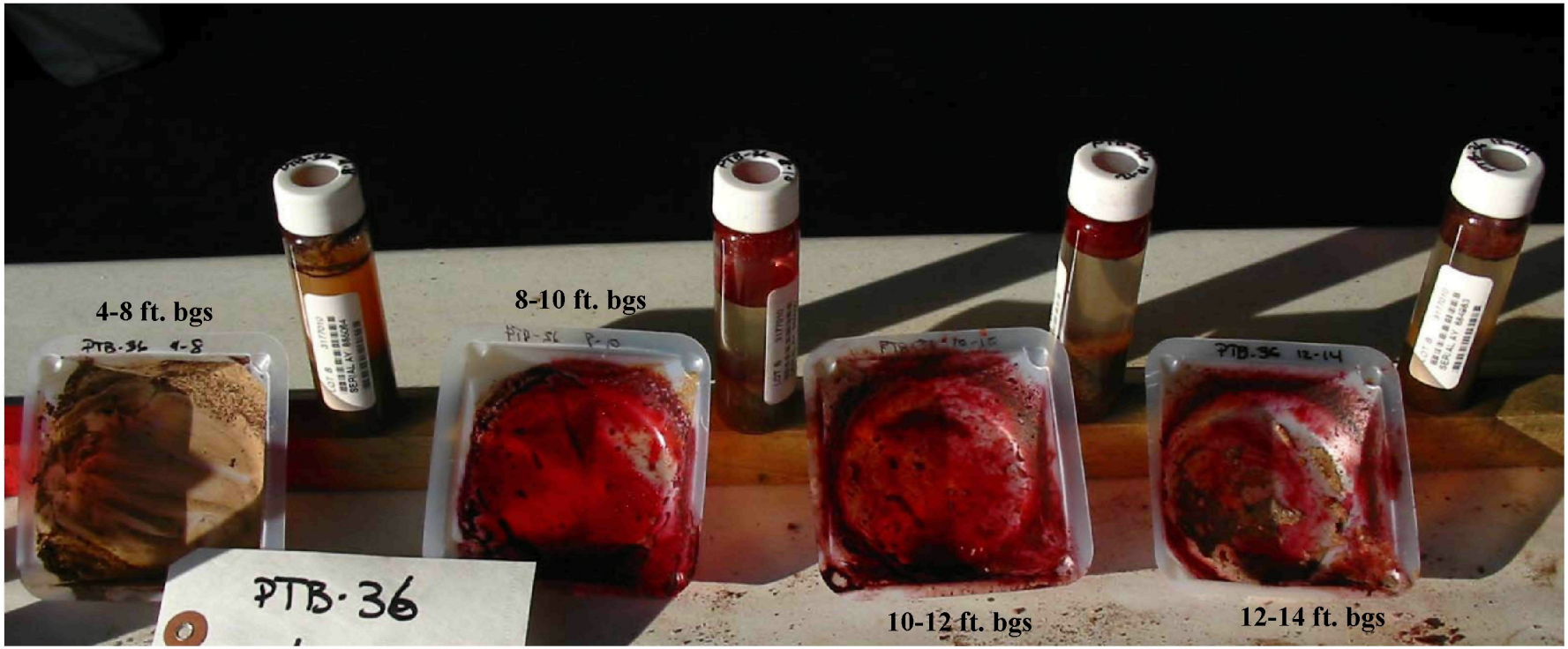

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PTB-36 (8-12 feet bgs)

SRSNE Superfund Site
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PTB-37 (1-14 feet bgs)

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PTB-38 (1-14 feet bgs)

SRSNE Superfund Site
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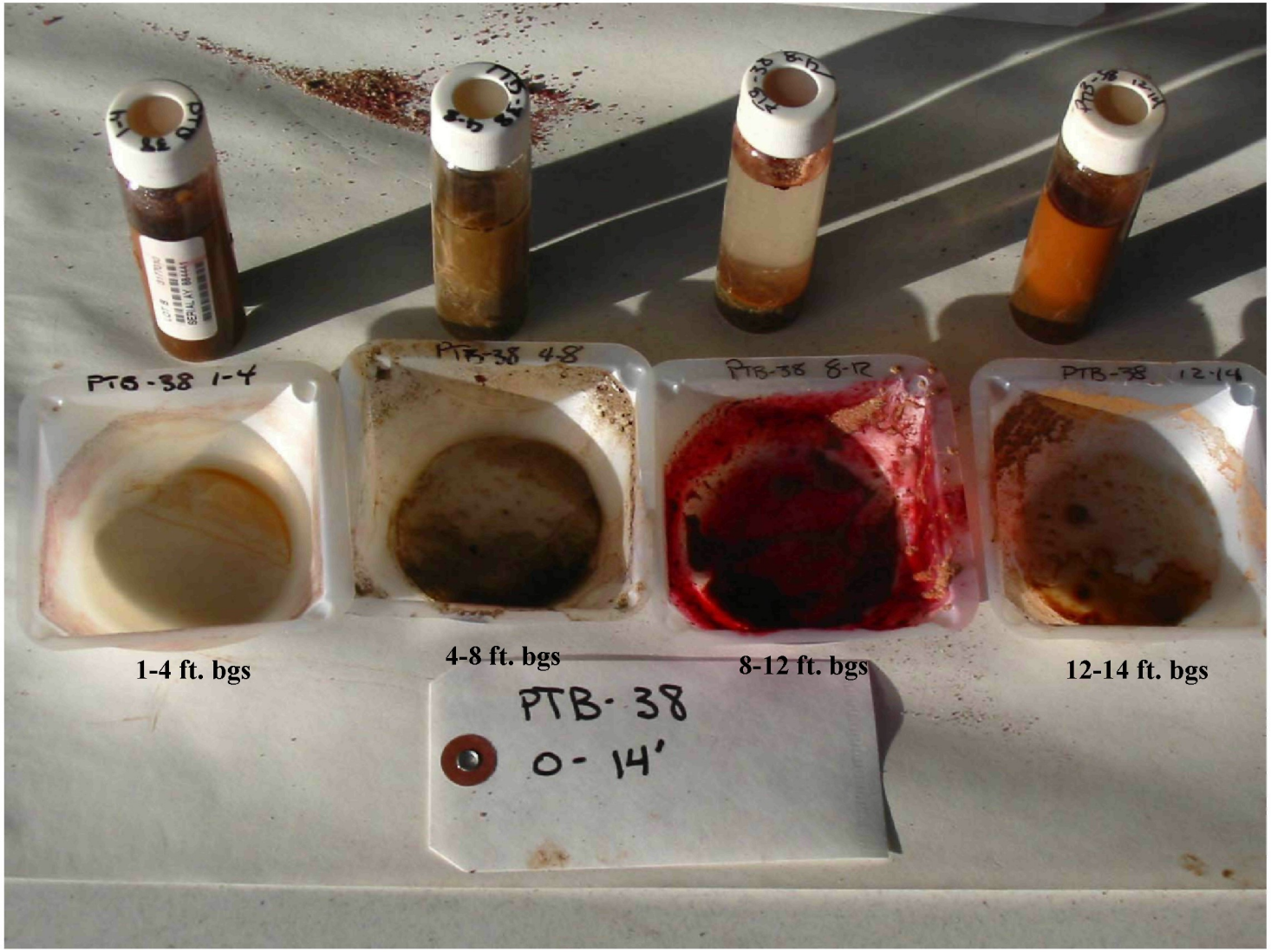
NAPL Delineation Pilot Study



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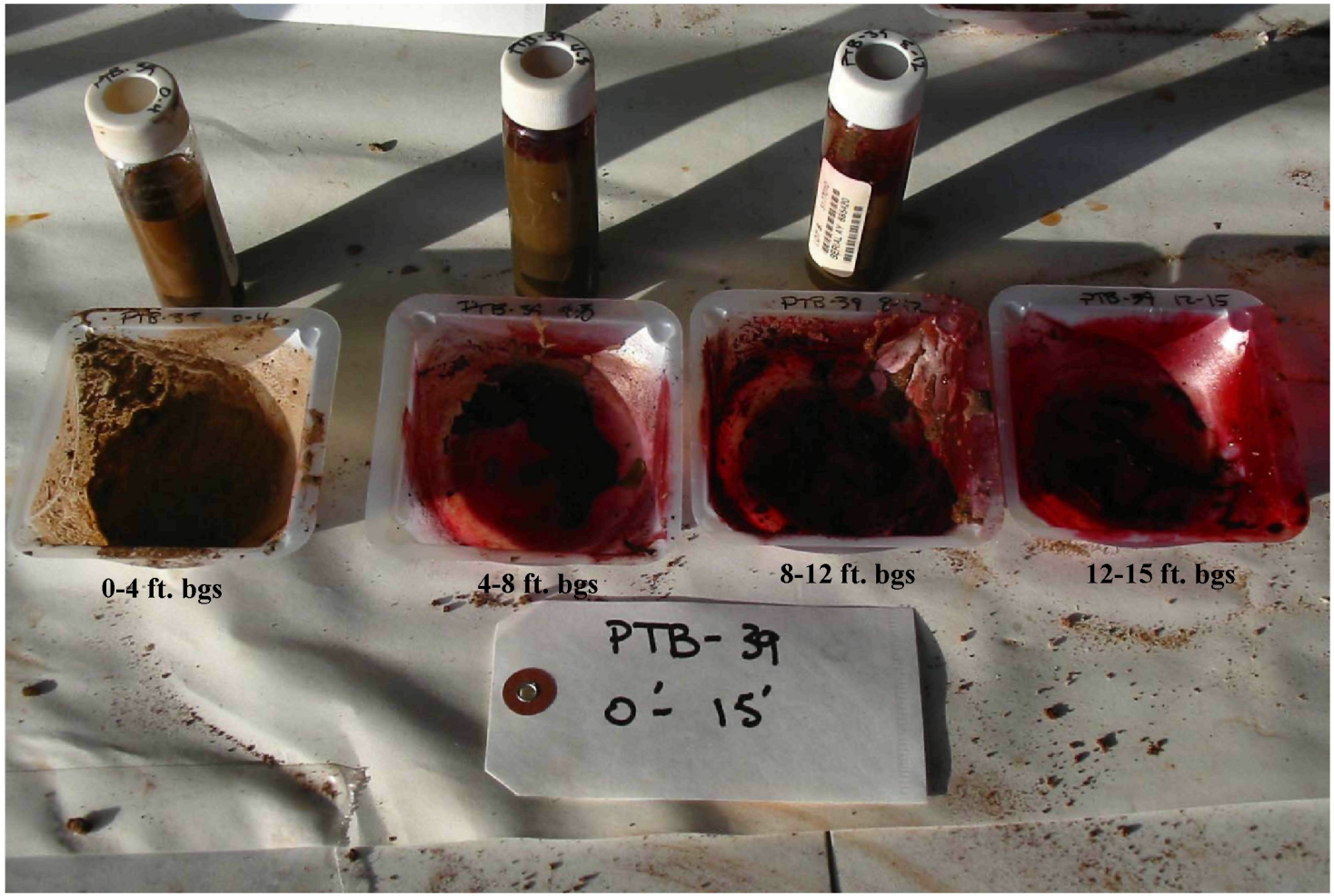
PTB-39 (0-15 feet bgs)

SRSNE Superfund Site
Southington, Connecticut
NAPL Delineation Pilot Study



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